



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

re application of

MICHAEL SHU-HUAN WANG ET AL.

Serial No. 10/718,921 (TI-34402)

Filed November 21, 2003

For: CHEMICAL MECHANICAL POLISHING APPARATUS AND METHOD TO
MINIMIZE SLURRY ACCUMULATION AND SCRATCH EXCURSIONS

Art Unit 3723

Examiner Shantese L. McDonald

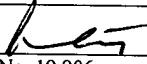
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Jav M. Cantor, Reg. No. 19,906

Sir:

BRIEF ON APPEAL

REAL PARTY IN INTEREST

The real party in interest is Texas Instruments Incorporated, a Delaware corporation with offices at 7839 Churchill Way, Dallas, Texas 75251.

RELATED APPEALS AND INTERFERENCES

There are no known related appeals and/or interferences.

STATUS OF CLAIMS

This is an appeal of claims 1, 2, 4 to 8 and 10 to 15. Claims 3 and 9 have been indicated to be allowable. Please charge any costs to Deposit Account No. 20-0668.

TI-34402-1

STATUS OF AMENDMENTS

An amendment was not filed after a second or subsequent rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

As stated in the specification, it has been determined in accordance with the present invention that a problem exists in chemical-mechanical polishing of semiconductor wafers that there is a buildup of debris at the very center and at the axis of the cleaning pad, a region not washed or not completely washed by the prior art washing procedures. This problem, which has gone unrecognized, results in non-uniform polishing from wafer to wafer and can result in scratching of the wafer and other problems. These problems are alleviated by directing washing solution *directly at the axis of the pad* as well as the regions therearound when washing the pad between polishing cycles (from wafer to wafer).

The invention relates to an apparatus and method for cleaning a polishing pad of a chemical-mechanical polishing system which includes a first drive device coupled with the polishing pad for turning said polishing pad (110) on a center axis (150) in a first direction and a second drive device for moving the wafer (120) into mechanical contact with the polishing pad and for rotating the wafer in a direction opposite to the first direction. The apparatus includes a dispenser (130) located in proximity above the polishing pad for dispensing a slurry to the polishing pad, the slurry cooperable with the mechanical contact of wafer and polishing pad for effecting polishing of the wafer. The dispenser further includes a plurality of nozzles (page 7, lines 12-13) for delivering a wash solution (page 7, lines 15-18) to the polishing pad for cleaning the slurry from the polishing pad. An extension (page 8, lines 1-6, 210, 220, 250) on the

dispenser is coupled to a distal end of the dispenser for delivering the wash solution to an area proximate to and including the center axis for cleaning the slurry from the polishing pad.

The extension can include piping and a spray nozzle, the piping coupled to and extending from the dispenser toward the center axis, the spray nozzle coupled to the piping and cooperable therewith to direct a water spray to the polishing pad at a ninety degree angle or an adjustor coupled to the piping for extending the distance of the spray nozzle from the extension distal end.

The spray nozzle can be held in a position by the piping proximate the center axis directly above the polishing pad.

The dispenser can dispense the wash material to the polishing pad all along an area from the circumference of the polishing surface to the center axis.

The extension can deliver the wash solution to an area proximate to the center axis without any portion of the extension extending past the distal end of the dispenser toward the center axis.

GROUNDS OF REJECTION

Claims 1, 2, 4 to 8 and 10 to 15 were rejected under 35 U.S.C. 102(e) as being anticipated by Tolles (U.S. 6,702,651).

ARGUMENT

Claims 1, 2, 4 to 8 and 10 to 15 were rejected under 35 U.S.C. 102(e) as being anticipated by Tolles (U.S. 6,702,651). The rejection is without merit.

As stated above and in the specification, a principal feature of the present invention is the recognition that the center or axial portion of the cleaning pad was not being adequately cleaned between processing cycles (from wafer to wafer), resulting in the problems listed in the specification. This problem is nowhere taught or even remotely suggested by Tolles.

Claim 1 requires, among other features, an extension on said dispenser coupled to a distal end of said dispenser for delivering said wash solution to an area proximate to and including said center axis for cleaning said slurry from said polishing pad. No such feature is taught or suggested by Tolles. To begin with, as again stated, it has been determined in accordance with the present invention that a problem exists in the buildup of debris at the very center and at the axis of the cleaning pad, a region not washed or not completely washed by the prior art washing procedures. This problem, which has gone unrecognized, is alleviated by directing washing solution directly at the axis of the pad as well as the regions therearound. Nothing in Tolles teaches or suggests the problem or its solution. In order for the arm 40 of Tolles to provide wash water to the axis of the pad, it would be necessary that the arm either extend beyond the center of the pad and have nozzles at the pad center or have nozzles aimed at the pad center. Nothing of the sort is taught or suggested by Tolles. In fact, a review of column 8, lines 23ff and Fig. 6 of Tolles indicates that the slurry is delivered through tube 42 which appears to be directed at a central portion of the pad (not the axis of importance herein) with the spray nozzles 44 and air nozzles 46 directed outwardly from the axis and clearly not directed at or toward the axis. It

follows that Tolles fails to teach or even suggest the feature noted above in claim 1 or the combination as claimed.

Claims 2 to 6 therefore define patentably over Tolles for at least the reasons presented above with reference to claim 1.

Claim 2 further limits claim 1 by requiring that the extension include piping and a spray nozzle, the piping coupled to and extending from the dispenser toward the center axis, the spray nozzle coupled to the piping and cooperable therewith to direct a water spray to the polishing pad at a ninety degree angle. No such structure is found in Tolles, especially since Tolles fails to have an extension in the first place.

Claim 7 contains structure similar to that discussed in connection with claim 1 and thereof defines patentably over Tolles for the reasons presented above in connection with claim 1.

Claims 8, 10 and 11 depend from claim 7 and therefore define patentably over Tolles for at least the reasons presented above with reference to claim 7

Claim 8 is substantially the same as claim 2 and therefore the argument presented as to claim 2 applies except for the dependency.

Claim 12 requires, among other steps, dispensing a wash material directly to the most central portion of the polishing surface about and including the axis. As discussed above with reference to claim 1, Tolles does not teach or suggest washing at the most center portion of the polishing surface about and including the axis.

Claims 13 to 15 depend from claim 12 and therefore define patentably over Tolles for at least the reasons presented above with reference to claim 12.

Claim 13 further limits claim 12 by requiring providing a spray arm for dispensing wash material and providing a spray extension which is coupled to the dispensing arm of chemical

mechanical polishing system for dispensing wash material directly to the most center portion of polishing surface about and including axis. As discussed above with reference to claim 1, no extension is found in Tolles nor does Tolles teach or suggest the function of the provided spray extension as claimed.

said axis.

CONCLUSIONS

For the reasons stated above, reversal of the final rejection and allowance of the claims on appeal is requested that justice be done in the premises.

Respectfully submitted,



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CLAIMS APPENDIX

The claims on appeal read as follows:

1. An apparatus for cleaning a polishing pad of a chemical-mechanical polishing system which includes a first drive device coupled with said polishing pad for turning said polishing pad on a center axis in a first direction and a second drive device for moving said wafer into mechanical contact with said polishing pad and for rotating said wafer in a direction opposite to said first direction, comprising:

a dispenser located in proximity above said polishing pad for dispensing a slurry to said polishing pad, said slurry cooperable with said mechanical contact for effecting polishing of said wafer, said dispenser further including a plurality of nozzles each nozzle for delivering a wash solution to said polishing pad for cleaning said slurry from said polishing pad; and

an extension on said dispenser coupled to a distal end of said dispenser for delivering said wash solution to an area proximate to and including said center axis for cleaning said slurry from said polishing pad.

2. The apparatus of Claim 1, wherein said extension includes piping and a spray nozzle, said piping coupled to and extending from said dispenser toward said center axis, said spray nozzle coupled to said piping and cooperable therewith to direct a water spray to said polishing pad at a ninety degree angle.

4. The apparatus of Claim 2, wherein said spray nozzle is held in a position by said piping proximate said center axis directly above said polishing pad.

5. The apparatus of Claim 1, wherein said dispenser dispensing said wash material to said polishing pad all along an area from the circumference of said polishing surface to said center axis.

6. The apparatus of Claim 1, wherein said extension delivers said wash solution to an area proximate to said center axis without any portion of said extension extending past the distal end of said dispenser toward said center axis.

7. A system for chemical mechanical polishing of semiconductor wafers, said system comprising:

a first drive device coupled with a polishing pad of a circular shape for turning said polishing pad on a center axis in a first direction;

a dispenser located in proximity above said polishing pad for dispensing a slurry to said polishing pad;

a second drive device for moving said wafer into mechanical contact with said polishing pad and rotating said wafer in a direction opposite to said first direction and cooperable with said dispensed slurry for effecting polishing of said wafer;

said dispenser further including a plurality of nozzles, each nozzle for delivering a wash solution to said polishing pad; and

an extension on said dispenser coupling to a distal end of said dispenser for delivering said wash solution to an area proximate to and including said center axis for cleaning said slurry from said polishing pad.

8. The system of Claim 7, wherein said extension includes piping and a spray nozzle, said piping coupled to and extending from said dispenser toward said center axis, said spray nozzle coupled to said piping and cooperable therewith to direct a water spray to said polishing pad at a ninety degree angle.

9. The system of Claim 7, wherein said extension further includes a adjustor coupled to said piping for extending the distance of the spray nozzle from said extension distal end.

10. The system of Claim 8, wherein said spray nozzle is held in a position by said piping proximate said center axis directly above said polishing pad.

11. The system of Claim 7, wherein said delivers said wash solution to an area proximate to said center axis without any portion of said extension extending past the distal end of said dispenser toward said center axis.

12. A method for cleaning a polishing pad in a chemical mechanical polishing system, comprising the steps:

imparting relative motion to said polishing pad, wherein said polishing pad is rotated about a center axis which is perpendicular to the polishing surface of said polishing pad; and

dispensing a wash material directly to the most center portion of said polishing surface about and including said axis.

13. The method of Claim 12, further including providing a spray arm for dispensing said wash material and providing a spray extension which is coupled to the dispensing arm of said chemical mechanical polishing system for dispensing said wash material directly to the most center portion of said polishing surface about and including said axis.

14. The method of Claim 12, further comprising dispensing a de-ionized water solution directly to the most center portion of the polishing surface about said axis following polishing of a semiconductor wafer.

15. The method of Claim 12, further comprising dispensing wash material from said dispensing arm to said polishing pad all along an area from the circumference of said polishing surface to said axis.

EVIDENCE APPENDIX

Not applicable

RELATED PROCEEDINGS APPENDIX

Not applicable